

REMARKS

Claims 25 and 27-45 are pending in the application. Of these, claims 25, 39, and 43 are independent. Claim 25 is amended. Claims 1, 3-6, 8-11, 14-24, and 26 are cancelled without prejudice to or disclaimer of the subject matter therein.

Rejection Under 35 U.S.C. § 112

In the Office Action, claim 25 is rejected under 35 U.S.C. § 112, second paragraph for allegedly being indefinite. The Office Action states that the “primary and circulating gas supply systems are claimed independent” and “connected.” However, claim 25 does not recite that the primary and circulating gas supply systems are completely independent, as suggested in the Office Action. Instead, claim 25 recites that the systems are “independent of each other at said shower head.” When the claim language is considered in context, the recitations “independent of each other at said shower head” and “connected with each other via piping” are not inconsistent. Therefore, claim 25 is not indefinite. Applicants respectfully request that the rejection be withdrawn.

Rejections Under 35 U.S.C. § 103

In the Office Action, claims 1, 3-6, 8-11, 14-23, 25, and 26 are rejected under 35 U.S.C. § 103 as being unpatentable over JP 409251981A to Kurihara *et al.* (Kurihara) in view of U.S. Patent No. 6,086,677 to Umotoy *et al.* (Umotoy) and in view of U.S. Patent No. 5,453,124 to Moslehi *et al.* (Moslehi). Applicants have cancelled claims 1, 3-6, 8-11, 14-23, and 26. Claim 25 is amended only to remove limitations unnecessary for patentability.

Claim 25 is directed to a processing apparatus including a gas supply mechanism that supplies a processing gas into a processing chamber via a plurality of

gas supply holes formed at a shower head and including a plurality of primary gas supply holes and a plurality of circulating gas supply holes. An evacuating mechanism evacuates the processing gas from the processing chamber, and a gas circulating mechanism returns at least a portion of exhaust gas evacuated from the processing chamber to the gas supply mechanism. The gas supply mechanism includes a primary gas supply system that supplies primary gas supplied from a processing gas source into the processing chamber via the primary gas supply holes, and a circulating gas supply system that supplies at least a portion of the exhaust gas into the processing chamber via the circulating gas supply holes with the primary gas supply system and the circulating gas supply system constituted as systems independent of each other at the shower head. The primary gas supply system and the circulating gas supply system are connected with each other via piping having a means for flow rate adjustment mounted thereon.

Kurihara teaches a semiconductor manufacturing system that includes a chemical cylinder 111 which supplies process gas to a vacuum tube 101 through a nozzle. A turbo molecular pump 105 is connected to the vacuum tube 101, and a recycle line 107 extends between the exhaust side of the pump 105 and the vacuum tube 101. See Kurihara, paragraph 11. FIG. 5 shows the holes from the recycle line being located at one side of the nozzle and the holes from the process gas supply being located at the other side of the nozzle.

Umotoy teaches a dual gas faceplate for a showerhead in a semiconductor wafer processing system. The showerhead includes a portal region 200 having two sets of holes 204 and 206, that provide gases to a process region without commingling the

gases prior to entering the process region. See Umotoy, column 2, lines 39-43; column 2, line 66-column 3, line 1. The hole size, however, may vary across the faceplate surface so that gas flow rates through the holes are correlated with the location of the hole in the faceplate. See Umotoy, column 5, lines 38-43.

Moslehi discloses a multi-zone gas injector 12 with a showerhead plate 18 that includes a plurality of orifices 22 located in a center zone 24. A plurality of orifices 26 are arranged in an annular configuration encircling the center zone 24, and forming a middle zone 28. A third series of orifices 30 are arranged in an annular configuration to encircle the orifices 26. See Moslehi, column 3, lines 47-58. Each zone is attached to a flow control for independently controlling the amounts and ratios of gas to each zone. See Moslehi, Abstract.

However, none of Kurihara, Umotoy, and Moslehi, alone or in combination, establishes a *prima facie* case of obviousness. To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference(s) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488 (Fed. Cir. 1991). See MPEP § 2143. For the reasons set forth in previous papers, Applicants submit that the references are not combinable for a lack of motivation to combine.

In addition, the cited art does not teach or suggest a processing apparatus with all the features recited in claim 25 including, a primary gas supply system and a

circulating gas supply system “constituted as systems independent of each other at said shower head” and that are “connected with each other via piping having a means for flow rate adjustment mounted thereon.” During processing there may be times when the circulating gas Q2 is not flowing into the processing chamber. During these times, the circulating gas holes h2 can still be utilized as supply holes for the processing gas by directing the primary gas Q1 to the circulating gas holes. Valve V5, at the second primary gas piping 148, may control the flow rate of the primary gas Q1 through the circulating gas supply holes h2. See Specification, page 28, lines 5-11.

Kurihara discloses a semiconductor manufacturing system with a recycle line 107. See Kurihara, paragraph 11. FIG. 5 shows the holes from the recycle line being located at one side of the nozzle and the holes from the process gas supply being located at the other side of the nozzle. Umotoy discloses a dual gas faceplate configured to provide gases to a process region without commingling the gases prior to entering the process region. See Umotoy, column 2, lines 39-43; column 2, line 66-column 3, line 1. Moslehi discloses a multi-zone gas injector 12 with a showerhead plate 18 that includes a plurality of orifices 22 located in zones. See Moslehi, column 3, lines 47-58.

However, none of the cited references, alone or in combination, teaches or suggests a processing apparatus as recited in claim 25, including a primary gas supply system and a circulating gas supply system “constituted as systems independent of each other at said shower head” and that are “connected with each other via piping having a means for flow rate adjustment mounted thereon.” Applicants respectfully request that the Examiner withdraw the rejection of claim 25.

New Claims

Claims 27-38 depend from and add additional features to independent claim 25. Accordingly, these claims are patentable for at least the reasons set forth above. Each of claims 27-38 include subject matter from at least one of cancelled claims 1-24. New claims 39 and 43 are independent method claims reciting features not taught or suggested by the art of record. Support for the method claims can be found in the Specification and claims as originally filed. These method claims recite method steps not taught or suggested by the prior art. Accordingly, claims 39 and 43, and the claims depending therefrom, should be allowable.

Conclusion

In view of the foregoing amendments and remarks, Applicants respectfully request reconsideration of this application and the timely allowance of the pending claims. Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 06-0916.

Respectfully submitted,

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